South Dakota
Alternate Academic Content and Achievement Standards

Science Introduction

Board Approved
January 24, 2006

Special Education Programs
Mission Statement

Special Education Programs located in the South Dakota Department of Education advocates for the availability of the full range of personnel, programming, and placement options, including early intervention and transition services, required to assure that all individuals with disabilities are able to achieve maximum independence upon exiting from school.

Acknowledgements

The South Dakota Alternate Academic Content and Achievement Standards for Science are a result of the contributions of many educators from across the state. Many hours of collaboration were devoted to ensure the Alternate Standards would be appropriate for students of all ability levels. The Alternate Standards committee members represent the many concerned individuals across the state dedicated to their profession and to high quality standards for South Dakota students with disabilities. The Alternate Standards would not have been possible without their contributions. The South Dakota Department of Education wishes to express appreciation and gratitude to the individuals and the organizations they represent who contributed expertise and time to write the Alternate Standards.

South Dakota Alternate Academic Content and Achievement Standards Committee for Science

The South Dakota Department of Education acknowledges the leadership of consultant Cheryl Holder Ph. D. for her vision and guidance in the development of this document.

Michele Anderson, Elementary Special Education Teacher, Sioux Falls Public School District
Darwin Daugaard, High School Science Teacher, Dell Rapids Public School District
Tamara Faw, Special Education Teacher K-12, Lower Brule School System
Nancy Flint, Middle School Science Teacher, Aberdeen Public School District
Judy Galvin, High School Science Teacher, Redfield Public School District
Marge Hauser, Middle School Science Teacher, Brandon Valley Public School District
Tammi Haverly, Education Specialist, Childrens Care Hospital and School, Sioux Falls
Vennie Heibel, Middle School Science Teacher, Pierre Public School District
Roberta Kambestad, Elementary Teacher, Rapid City Public School District
Becky Kitts, Elementary Teacher, St. Joseph School, Pierre
Erica Larson, Middle School Special Education Teacher, Vermillion Public School District
Arnold Lund, High School Science Teacher, Kadoka Public School District
Nina McCain, High School Science Teacher, Takini School
Laura Mehlhaf , Elementary Teacher, Rapid City Public School District
Tracy Norman, Elementary Teacher, Aberdeen Public School District
Pegge Poppe Basham, Elementary Teacher, Douglas Public School District
Susan, Pulford, Elementary Teacher, Lennox Public School District
Sherry Richter, Elementary Teacher, Douglas Public School District
Karen Roe, Elementary Special Education Teacher, Watertown Public School District
Karen Ronne, Elementary Teacher, Deubrook Public School District
Melissa Schoenfelder, High School Special Education Teacher, Brandon Valley Public School
Jeff Selchert, Middle School Special EducationTeacher, Sioux Falls Public School District
Mary Skinner, High School Special Education Teacher, Sioux Falls Public School District
Kelly Stone, Elementary Special Education Teacher, Vermillion Public School District
Linda White, Middle School Special Education Teacher, Aberdeen Public School District

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To download the Alternate Standards, visit the SD Department of Education website at http://doe.sd.gov/contentstandards/

For further information or questions concerning the Alternate Standards, contact the Special Education Programs at 605-773-3678.

Overview of South Dakota Academic Standards

The South Dakota academic content standards provide a listing of essential core content to be taught and learned. The content and achievement standards are designed to guide the planning of instruction and to anchor the assessment of learning from kindergarten through twelfth grade. Performance descriptors bridge the content standards to assessments of the standards, provide information to teachers and students regarding student progress toward mastery of the standards, and give them specific targets for instruction and learning. The academic standards document presents a starting point for informed dialogue among those dedicated and committed to quality education in South Dakota. By providing a common set of goals and expectations for all students in all schools, this dialogue will be strengthened and enhanced.

All South Dakotans are eager to ensure that graduates of South Dakota's public schools have the knowledge, skills, and competencies essential to leading productive, fulfilling, and successful lives as they continue their education, enter the workforce, and assume their civic responsibilities.

The Standards Committee developed the current South Dakota Content Standards and Performance Descriptors utilizing input from students, parents, teachers, and South Dakota communities. Final documents evolved from: recent research in best practices, **No Child Left Behind** legislation, and classroom experience with existing South Dakota Content Standards, evolution of published standards from other states, numerous professional publications, and lengthy discussions by experienced K-16 South Dakota teachers.

SOUTH DAKOTA ALTERNATE ACADEMIC STANDARDS OVERVIEW

South Dakota first established content standards for students with disabilities in 2000, meeting the requirements of IDEA. These Functional Standards were implemented during the 2000-01 school year and assessed using the state's alternate assessment. The Functional Standards were revised in the spring of 2004 to meet NCLB requirements and were renamed as Extended Standards. The South Dakota Board of Education (SDBOE) approved the Extended Standards for Reading and Mathematics in September 2004 and districts implemented them immediately during the 2004-05 school year. These standards were written broadly to encompass grades K-12 for both reading and math content standards.

As guidance and regulations became available concerning alternate academic achievement standards, SD DOE realized the need to establish the Reading and Mathematics Alternate Standards by grade level, linking them to grade-level content. The Extended Standards were revised during the winter of 2005 to establish Alternate Standards for each grade K through 12 for reading and for math at grades K-8 and at grade spans for grades 9-12. These standards were presented to the SDBOE for the first hearing in March 2005 as South Dakota Alternate Academic Content and Achievement Standards and were posted on the state's website and disseminated for public comment prior to the Board meeting in May. Revisions were made to

the draft document based upon recommendations from stake holders and the final version of the Reading and Mathematics Alternate Standards were presented to the SDBOE on May 17, 2005 and approved. Districts will implement these revised Alternate Standards during the 2005-2006 school year.

In July of 2005, and another workgroup was established to write Alternate Standards for Science. Science Alternate Content standards are required to meet NCLB requirements to have an assessment system in place for Science by the school year 2007-2008. The initial draft of the Science Alternate Content Standards and Achievement Descriptors were presented to the SDBOE for the first hearing in November of 2005 and were posted on the state's website for public comment prior to the Public Hearing to the Board in January 2006.

The Department of Education selected a diverse group of educators to develop alternate standards and achievement (performance) descriptors for application to the education of students with significant cognitive disabilities. The workgroup, charged with the task of developing the Alternate Academic Content and Achievement Standards, used the South Dakota academic content standards as a reference document when developing the Alternate Content Standards. The goals and indicators come directly from the South Dakota content standards. The Alternate Academic Content and Achievement Standards are written for each grade ranging from Kindergarten to Grade 12 for reading and at grades K-8 and at grade spans for grades 9-12 in math and science.

When developing the Alternate Content Standards, the workgroup carefully divided the skills into four levels of complexity: advancing, applying, developing, and introducing. Each level of complexity was used as a guide and the student's age appropriate environment was considered. The categories range on a scale of more complex to less complex skills. Achievement descriptors are organized into performance levels. These levels describe how a student at that level would be expected to perform on the Alternate Content Standards.

Achievement descriptors and target skills were developed for each performance level and for each grade. Target skills developed in the context of grade level curriculum and serve as entry points to the Alternate Standards. These skills were developed to provide a tool for students to work towards the alternate content standard and examples represent some possible activities or skills instructors could use in teaching the Alternate Content Standards. **Target skills and examples are not provided when the meaning of the Alternate Content Standard should be evident to the reader**. These entry points provide a range of options at which a student with a disability can access the learning standards. The skills found in the Alternate Content and Achievement Standards introduce students to challenging new ideas and content, promoting movement to grade level standards.

Training for educators will assure all children have access to the South Dakota content standards through the Alternate Academic Content and Achievement Standards. Educators will be trained in the correct use of target academic skills with emphasis on how the skills should be taught in the context of grade level curriculum. Educators will be trained to align South Dakota curriculum with the Alternate Academic Content and Achievement Standards and to incorporate them when developing Individual Education Plans (IEPs). Upon completion of training, participants will be able to describe the components of South Dakota's Alternate Academic Content and

Achievement Standards and their relationship to the South Dakota content standards, incorporate the Alternate Standards into the IEP process, implement the Alternate Academic Content Standards through instruction, and understand the implementation requirements of the alternate assessment.

What are the Alternate Content Standards?

Many students with disabilities are able to work toward the content standard goals. However, the standards, as developed, do not appropriately address the educational needs of all students. Therefore, Alternate Content Standards have been developed to meet individual student needs.

The Alternate Content Standards expand the developmental spectrum of the South Dakota content standards. This allows all students the opportunity to access the general education curriculum.

The Alternate Content Standards are:

- a user-friendly guide in assisting with IEP development
- a progression of skills necessary for independent functioning (birth through age 21)
- academically based (presently in reading and mathematics)
- based on (parallel) the state academic content standards

The South Dakota Academic Content Standards together with the Alternate Academic Content and Achievement Standards create a statewide system designed to support students, parents, teachers, and schools to uniformly promote high academic standards for all students in South Dakota.

Who will use the Alternate Content Standards?

The following are guidelines to assist the IEP team in determining which students will be instructed and assessed using the Alternate Academic Content and Achievement Standards.

- Even with modifications and accommodations, the general education standards are deemed inappropriate for the student's cognitive ability and adaptive skill levels.
- The student requires extensive direct instruction in multiple settings to apply and transfer skills.
- The student requires substantial adjustment to grade level content standards.
- A student is not eligible to use the Alternate Content Standards if the primary reason for consideration is the result of extended absences, visual, auditory or physical disabilities, social, cultural or economic differences.

Students with disabilities must participate in the statewide assessment in order to measure their performance of content found in the State's Content Standards/Alternate Content Standards. This

means students with disabilities that are working in the general academic content standards will take the **Dakota STEP** with or without accommodations. Students working in the Alternate Content Standards will take the alternate assessment, **Dakota STEP – A**.

How does the IEP team use the Alternate Content Standards?

Once the IEP team determines which Alternate Content Standards are appropriate for a student, the team discusses the relationship of grade level standards to the Alternate Content Standards appropriate for the student:

- to determine the impact on curriculum and instruction
- to use Alternate Content Standards as a basis for the development of the individualized education plan

Educators will use the Alternate Content Standards document to align and develop instruction for students who will participate in the alternate assessment aligned to Alternate Achievement Standards, as determined by the IEP team. This document's Alternate Content Standards and target skills identify how and at what level of complexity students will address and attain learning standards. Educators can set realistic and challenging academic goals for individual students aligned with the general content standards. The Alternate Content Standards encourage teachers to reach for higher levels of achievement for their students.

As a reader becomes familiar with this document, they will discover the goal statements and indicators are retained from the South Dakota academic content standards. Alternate content standards are referenced by grade levels **for Kindergarten through Grade 12 for reading and for grades K-8 and High School Core in math and science, mirroring the design of the academic content standards.** Each alternate content standard is intended to capture the "essence" of the South Dakota general education content standards. Target skills under each alternate content standard provide "entry points" towards attaining the alternate content standard.

"Entry Points" to the Alternate Content Standards

Target skills can be viewed as entry points of student performance related to the Alternate Content Standards. These "entry points" provide a range of options at which a student with a disability can access the learning standard at a challenging level. These "entry points" are a tool to be used by educators and parents to identify instructional goals and objectives for the student. Target skills are listed under each Alternate Content Standard and represent what a student might do at that particular grade level.

Target skills are defined as higher level skills that enable students with disabilities to individually utilize the Alternate Content Standards in order to demonstrate a link to the South Dakota Content Standards.

- Using target skills in the context of academic instruction benefits students in the following ways:
- Allows students access to the general education standard
- Introduces students to challenging new ideas and content
- Provides new opportunities to practice skills in a variety of settings using a range of instructional approaches
- Achieves outcomes that exceed expectations

Target skills are aligned to the Alternate Content Standards. The Alternate Content Standards are aligned to the general education goals/strands and indicators. Target skills allow the student with a severe disability to gain access to the general curriculum.

An IEP team can use the target skills as examples when determining the skill a student needs to work on to progress towards the Alternate Content Standard. The target skill allows the student to work toward an alternate content standard that is the basis for the assessment of the student with a severe disability. This allows the student to gain access to the general curriculum.

In other words, the IEP team can use the alternate content standard and the target skills, under each indicator to determine ***where the student is*** *at the beginning of the school term,* ***where the student may reasonably be taken through instruction*** *during the school term, and thus* ***determines the assessment item for progress reporting and assessment reporting.***

Alternate Academic Achievement Standards

Alternate content standards and achievement descriptors have been established for reading and math. The Department of Education received approval by the State Board of Education in May 2005. Academic achievement standards consist of three components: achievement levels, achievement descriptors, and cut scores. Definitions of alternate achievement levels are expressed through the achievement descriptors. Cut scores for performance levels were established in the summer of 2005. Harcourt Educational Measurement guided a standards setting process with the Department of Education in establishing alternate achievement levels for reading and math. South Dakota teachers participated in the standards setting procedure to provide teacher judgment.

Achievement Levels

The State of South Dakota has defined four levels of student achievement for the Alternate Academic Achievement Standards: These levels are listed beside their corresponding performance level for grade level expectations.
Advancing = Advanced
Applying = Proficient
Developing = Basic
Introducing = Below Basic

Achievement Descriptors (Performance Descriptors)

Alternate achievement descriptors describe each performance level and were written for each grade for each standard. These descriptors indicate how a student at that level would be expected to perform on the Alternate Content Standards. Frequency, setting, and level of support are factors that should be considered during instruction and assessment in order to discriminate increases in performance of skills at each level. **For the purpose of this document, support is defined as providing directed help or assistance through such means as encouragement, prompting, or by personally aiding the student to accomplish a task.**

Continuum of frequency, setting, and support.	
4	Students demonstrate knowledge and skills consistently across multiple settings without support.
3	Students demonstrate knowledge and skills more than once in more than one setting without support.
2	Students demonstrate knowledge and skills once in one setting with minimal support.
1	Students attempt to demonstrate knowledge and skills once in one setting with support.

South Dakota Science Standards K-12

KEY CONSIDERATIONS FOR SCIENCE STANDARDS DEVELOPMENT

As students move from kindergarten through grade 12, levels of cognitive demand and complexity of content, skills, and processes increase. New skills emerge and basic skills are subsumed within more advanced skills as students progress through the grades. In particular, mastery of Nature of Science standards and Science, Technology, Environment, and Society standards tends to emerge in later grades. These processes and skills are taught and practiced as Physical, Life, and Earth/Space Science content and skills are acquired. Mastery of most science content standards, however, requires a level of cognitive development not attained by most students until intermediate or middle school grades. Based on information available through national standards work and developmental research, consideration has been given in these standards to the developmental appropriateness of skills required at each grade level. In consideration of developmental appropriateness, the committee has provided emphasis in each grade span as follows.

- Kindergarten through grade 2 standards emphasize building foundational skills in Physical, Life, and Earth/Space Sciences. Teachers guide students through a variety of activities to learn this content.
- Grades 3 through 5 standards continue the emphasis on the Physical, Life, and Earth/Space Science strands with emerging mastery of skills in the Science, Technology, Environment, and Society strand. The Nature of Science strand continues to be represented in the teaching and learning process through a variety of activities applied to Physical, Life, and Earth/Space Science strands.
- Grade 6 standards emphasize an integration of Physical, Life, and Earth/Space Science. Grade 7 standards emphasize Life Science. Grade 8 standards emphasize Earth/Space Science. Nature of Science and Science, Technology, Environment, and Society standards continue to emerge over these grades. (After careful consideration of current research and input from educators throughout the state, the Committee revised former middle school standards to facilitate effective instruction and student mastery.)
- Grades 9 through 12 standards emphasize continuing mastery of the Nature of Science strand and the Science, Technology, Environment, and Society strand in applications to Physical, Life, and Earth/Space Science strands. Content may be embedded in the core classes of Physical Science and Biology or through advanced courses, such as Physics and Chemistry. This content should merge across strands realistically as they do in the natural world.
- The increase in the level of science mastery is a life-long process.

NATURE OF SCIENCE STANDARDS

Goal 1: Students will explore, evaluate, and communicate personal and scientific investigations to understand the nature of science.

RATIONALE:

The nature of science goal emphasizes those "processes of science" that should integrate with scientific knowledge to develop an understanding of how science works. Science involves a systematic approach to information gathering and problem solving through processes such as inquiry, observation, data analysis, experimentation, communication, and collaboration. Students use scientific inquiry to ask questions, plan and conduct investigations, use appropriate tools and techniques to gather data, think critically and logically about relationships between evidence and explanations, construct and analyze alternative explanations, and communicate scientific arguments. Through these processes, scientific knowledge is studied, tested, and increased over time.

Indicator 1: Understand the nature and origin of scientific knowledge.

Indicator 2: Apply the skills necessary to conduct scientific investigations.

PHYSICAL SCIENCE STANDARDS

Goal 2: Students will use appropriate scientific models to describe and quantify the nature and interactions of matter and energy.

RATIONALE:

Physical science is concerned with matter and energy, and the interactions between the two. Students begin the study of the physical world by learning about the properties of objects and materials, the position and motion of objects, light, heat, electricity, and magnetism. Understanding changes of properties in matter, motions, forces, and transfer of energy provide a basis for learning about the structure of atoms, structure of matter, chemical reactions, conservation of energy, and the interactions of energy and matter. The science facts, concepts, principles, theories, and models related to physical science that are important for all students to know, understand, and use are the focus of the standards for this goal.

Indicator 1: Describe structures and properties of, and changes in, matter.

Indicator 2: Analyze forces, their forms, and their effects on motions.

Indicator 3: Analyze interactions of energy and matter.

LIFE SCIENCE STANDARDS

Goal 3: Students will describe structures and attributes of living things, processes of life, and interaction with each other and the environment.

RATIONALE:

The life science standards emphasize a complex understanding of the characteristics and diversity of organisms and the interaction of organisms with their environment. Students begin by learning about the characteristics and life cycles of organisms and the interaction between organisms and various environments. Students develop an understanding of the relationship between structure and function in living systems, reproduction and heredity, regulation and behavior, populations and ecosystems, and diversity and adaptation of organisms. This knowledge provides a foundation for learning more complex concepts related to the structures and functions of the cell, heredity, behavior and interdependence of organisms, and the organization of living systems. Life science facts, concepts, principles, theories, and models that are important for all students to know, understand, and use are the focus of these standards.

Indicator 1: ***Understand the fundamental structures, functions, classifications, and mechanisms found in living things.***

Indicator 2: ***Analyze various patterns and products of natural and induced biological change.***

Indicator 3: ***Analyze how organisms are linked to one another and the environment.***

EARTH/SPACE SCIENCE STANDARDS

Goal 4: Students will analyze the composition, formative processes, and history of the universe, solar system, and Earth.

RATIONALE:

Earth/space science focuses on the processes and interactions of the universe, solar system, and Earth. Investigations of Earth focus on interacting and dynamic systems including the lithosphere, the hydrosphere, the atmosphere, and the biosphere. Each system is composed of unique characteristics which interact and interrelate to form a single, universal system. Forces acting throughout the solar system and the universe influence all bodies in space, including Earth. Studying the universe enhances our understanding of Earth and its place in the universe.

Indicator 1: ***Analyze the various structures and processes of the Earth system.***

Indicator 2: ***Analyze essential principles and ideas about the composition and structure of the universe.***

SCIENCE, TECHNOLOGY, ENVIRONMENT, AND SOCIETY STANDARDS

Goal 5: Students will identify and evaluate the relationships and ethical implications of science upon technology, environment, and society.

RATIONALE:

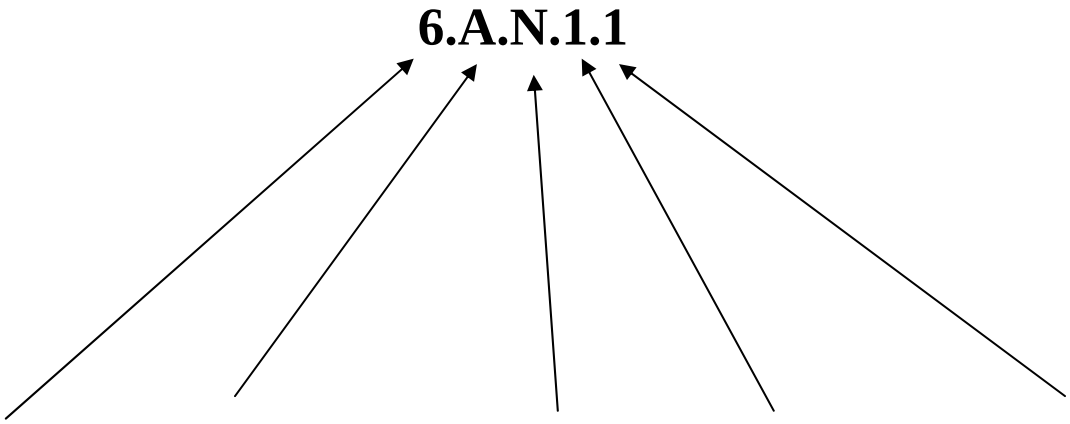
The interrelationships among science, technology, the environment, and society establish connections between the natural and designed worlds and provide students with opportunities to develop decision-making abilities. Technology is essential to science because it enhances scientific observations of phenomena and provides tools for investigations, inquiry, and analysis. Science and technology provide the solutions to many human problems; however, solutions may have unintended consequences. An important purpose of science education is to give students a means to understand and act on personal and social issues. These standards help students develop decision-making skills through a better understanding of the costs, benefits, risks, and constraints of scientific problem solving. These standards emphasize abilities associated with the process of design and fundamental understandings about the enterprise of science and its various linkages with technology.

Indicator 1: ***Analyze various implications/effects of scientific advancement within the environment and society.***

Indicator 2: ***Analyze the relationships/interactions among science, technology, environment, and society.***

Guide to the Numbering and Symbol System Used with the Alternate Reading and Alternate Math Standards

Alternate Content Standards are coded to cross reference content, indicators, and standards.



Grade indicates the grade level.

Alternate content refers to the extension of the general content goals and indicators.

Goal/Strand refers to content area of the major areas of science.

N for Nature of Science
P for Physical Science
L for Life Science
E for Earth and Space Science
S for Science, Technology, Environment, and Society

Indicator refers to the general education indicator for each goal or strand. Each goal or strand has one or more related indicators that describe key aspects of the goal or strand.

Standard refers to number of the Alternate Content Standard for the indicator. (Example: A.N.1.**1**, A.N.1.**2**, A.N.1.**3**) Each alternate content standard describes what the students will know and be able to do. The standard is the essence of the general education grade level instruction and curriculum standards.